Petrinet Editor User Manual

Contents:

Workspace and elements

The central part of the editor is the workspace on which it is possible to freely create places and transitions (page 3). Subsequently, arcs can be created from places to transitions or from transitions to places (page 3), producing the base structure of a petrinet. After the creation an element that can be interacted with will be displayed in red while the mouse pointer is located over it. The created nodes and arcs can now be selected individually, which makes them appear in the colors blue or cyan, depending on the kind of the selection (page 3). The nodes of the petrinet may be moved freely around the workspace after they have been created (page 4). If while creating and moving nodes more space is needed than is available in the current editor window, scrollbars will be added to the workspace, making an arbitrary amount of space accessible through scrolling (page 5). Nodes and arcs can be removed from the petrinet, if they are not needed anymore (page 5).

Any node of the petrinet can be given a name at any time, which will be displayed above the respective node (page 5). To support the functionality of a petrinet, tokens can be set on the places of the net (page 6). A single token is graphically represented as a point in the middle of the place. Larger token counts are displayed as a number in the middle of the place. However, the amount of tokens that can be set on a single place is limited to 999 by the editor. Active transitions are graphically represented by having a green square inside of them. To guarantee a fluent user experience, active transitions can be executed at any time (page 6). The editor does not support a separate simulation mode. Adjustment to individual usage requirements is possible by resizing the nodes and arrow heads to one of 4 preset sizes (page 6).

By using the undo and redo functionality (page 6), it is possible to take back any kind of change made to the petrinet and to retrace contruction or state changes.

A newly constructed or modified petrinet can be saved to the harddrive as a .xml or a .pnml file (page 6). It is also possible to load .xml or .pnml files from the harddrive, if they contain a valid petrinet (page 7). To start constructing a completely new petrinet, the whole workspace can be easily reset (page 7).

Selecting the input mode

The editor offers a total of six different input modes. These are composed of the three workspace modes, which control the response to mouse actions on the workspace and the three node modes, which control the response to mouse actions on the nodes. Although only one workspace mode and one node mode can be active at a given time, they can be freely combined.
It is possible to select from the workspace modes "Create Places" (page 3), "Create Transitions" (page 3) and "Select" (page 3) after clicking on the menu item "Workspace" in the main menu.

Additionally the workspace modes are represented in the toolbar by a circle ("Create Places"), a square ("Create Transtions") and a dashed square ("Select") and can be selected by left-clicking.

Selecting from the node modes "Select & Move" (page 3-4), "Create Arcs" (page 3) and "Manipulate Nodes" (page 6) is possible after clicking on the menu item "Nodes" in the main menu. Additionally the node modes are represented in the toolbar by a reticle ("Select & Move"), a small diagonal arrow ("Create Arcs") and the three numbers one, two and three which are shaped as a triangle ("Manipulate Nodes") and can be selected by left-clicking.

An alternate way to select the node mode is offered by the context menu of a node. In the context menu of each node, the desired mode can by selected under the heading "Nodes".

The currently selected input modes are shown with a check mark in front of them in the main menu and are highlighted in the toolbar.

Creating nodes

Places and transitions are created by selecting the respective workspace mode as described on page 2 and subsequent clicking inside the workspace with the left mouse button. In correspondence to the selected workspace mode, a place or a transition is now drawn and displayed as a circle or a rectangle with its center exactly at the point that was clicked. The coordinates of the newly created node in the petrinet are the coordinates of this center point.

Creating arcs

Arcs are created by selecting the corresponding node mode as described on page 2, subsequent dragging of the arc out of the start node and finally connecting it by dropping it on the target node. For this drag and drop operation the left mouse button needs to be pressed on the start node, the mouse needs to be moved over the target node while the left mouse button is still held down and the left mouse button needs to be released over the target. An arc is displayed in red during such a draw operation. If the mouse cursor is moved over a node that is compatible with the arc, a virtual preview arc will be displayed in green between this node and the start node. Eine Kante wird während des Zeichenvorgangs in Rot dargestellt. Once the mouse cursor leaves the compatible node, the green preview arc disappears and the red drawing arc will be displayed again.

Selecting elements

The editor allows the selection of nodes and arcs, in order to move them to a different position (page 4) or to delete them (Seite 5). Manually selected nodes and arcs are displayed in blue. Since move and delete operations on nodes also have an effect on the arcs that are connected to them, arcs

that are connected to a selected node are automatically displayed in cyan.

There are three distinct ways to select elements. The first one is the node mode "Select & Move", which can be selected as described on page 2. This mode may be used for selecting nodes or arcs individually and allows to freely move the selected nodes on the workspace immediately. To select an element in this mode, it is enough to just use the left mouse button while the cursor is over the desired element. In case two nodes are connected to each other in both directions, it is possible to separately select the two arcs between them. This works by using the left mouse button over that half of the double headed arrow between the nodes that contains the arrowhead of the desired arc. If the left mouse button is used while the shift key is held down, the newly selected element will be added to the existing selection, if there is one.

The second way to select elements is to draw a rectangle over the workspace with the mouse. This function is available in the workspace mode "Select", which can be selected as described on page 2. Once this workspace mode is activated, it is possible to press the left mouse button while the cursor is over an arbitrary place on the workspace, in order to drag a dashed rectangle out of that point while the left mouse button is held down. Once this rectangle is moved over the center of a node, the node will be selected. The selection will not be finalized until the left mouse button is released. If this operation is performed with held down shift key, the selected elements will be added to the existing selection, if there is one. The individual selection of arcs is not supported by this mode.

The third way to select elements is by using the "Select All" option. This option can be used by clicking on the menu item "Edit" in the main menu and selecting it from the drop down menu or by simply pressing Ctrl+A. It is also possible to use this option by left-clicking on the symbol that shows two overlapping dashed rectangles in the toolbar. Using this option selects all nodes and arcs currently on the workspace. However, this option is unavailable while an arc is being drawn.

Moving elements

It is possible to freely move nodes and indirectly also arcs directly after they have been placed on the workspace. In order to make use of this functionality, the nodes that are to be moved need to be selected first, as described on page 3. Once this is done the node mode "Select & Move" must be activated as described on page 2. Now it is possible to move all the selected elements at once by pressing the left mouse button while the cursor is located over any one of them and then dragging them to the desired location with the left mouse button held down. Once the desired location is reached, the move operation may be completed by releasing the left mouse button. If both of the nodes an arc is connected to are moved, the arc is automatically moved as well. If only one of the nodes an arc is connected to is moved, the arc is automatically adjusted to match its new position.

Extending the workspace

When the size of the editor window is increased, a node is dragged against the edge of the workspace, or a node is placed or made larger so close to the edge of the workspace that it would not be displayed fully anymore, the workspace is automatically extended to match the operation. If the extension was not caused by a change to the element size (page 6), the visible area will be adjusted, so the node that caused the extension will always remain fully visible. In case of multiple nodes being drawn against the edge of the workspace, this is the node that is dragged with the mouse.

A horizontal and a vertical scrollbar, which are displayed as soon as the size of the workspace becomes larger than that of the window, are used to navigate the extended workspace. Other than by using the scrollbars it is also possible to move area that is currently in view by dragging nodes or the arrowhead of an arc against the edge of the visible area. If the workspace still has more space remaining in the corresponding direction, the visible area will automatically be move so that the element that caused the move always remains fully visible.

Deleting elements

In order to delete elements from a constructed petrinet, they need to be selected first, as described on page 3. The selected elements can be deleted by pressing the Del key, pressing Ctrl+D, by clicking the menu item "Edit" and then "Delete" or by just clicking on the thrash bin in the toolbar with the left mouse button. However, it is not possible to delete while an arc is currently being drawn.

Setting node names

In order to give an individual name to a node, the context menu of the node needs to be opened first by right-clicking the node and the option "Change Name" needs to be selected. A cursor will appear above the node, allowing for input of a name. The maximal length of a name is 40 characters. The name entry is confirmed by pressing the Enter key or by just clicking on an arbitrary point in the editor window that is not part of the entered name. Once a name has been set on a node, it can be adjusted at will by simply clicking on it with the mouse. Of course it also remains possible to change the name through the corresponding option in the context menu. The name field above a node can be fully removed by deleting all of its characters.

Adjusting tokens on places

There are two ways to adjust the amount of tokens on a place. The first way is to use the node mode "Manipulate Nodes" that can be activated as described on page 2. In this node mode a left-click with the mouse on a place will cause the amount of tokens on the place to increase by one. If a left-click is performed while the Shift key is held down, the amount of tokens on the place will be reduced by one.

The second way to adjust the amount of tokens is to perform a right-click on the place and to select "Set Token Count..." from the context menu. A dialog window will appear through which a new token amount between 0 and 999 can be entered.

Performing transitions

In order to perform transitions it is necessary to first switch to the node mode "Manipulate Nodes" as described on page 2. Once this node mode is selected, a transition can be performed by simply left-clicking on the corresponding transition.

Adjusting the element size

The editor offers four different size levels for the displayed nodes and arrowheads. The selection of the size level is done by clicking on the menu item "Size" in the main menu and then selecting the desired size, or by using the dropdown box at the right end of the toolbar. The preselected size is 100%.

Undoing and redoing

In order to undo the most recent change made to the petrinet it is possible to either select "Edit" and then "Undo" from the main menu, left-click the undo-arrow in the toolbar or to simply press Ctrl+Z. To redo a change that has been undone, it is possible to either select "Edit" and then "Redo" from the main menu, left-click the redo-arrow in the toolbar or to simply press Ctrl+Y.

Saving a petrinet

It is possible to save the petrinet that was created with the editor as a XML file. To do this, the menu item "File" needs to be clicked and either "Save" or "Save As..." selected. Another way to save is to just press Ctrl+S or to left-click the corresponding symbols in the toolbar, which are the floppy disc for "Save" and the floppy disc with small dialog for "Save As...". If it is the first save of the session, a dialog will appear, allowing a save location and a filename to be selected. The filename extension

can be chosen between .pnml and .xml. If the selected extension is not manually entered with the filename, it will be appended by the editor automatically. Of course an already existing file can also be overwritten.

After having saved once, using the option "Save" allows it to save changes without any dialog directly into the most recently used file. If changes are to be saved in a new file, this can be done by using "Save As...", since this option always displays a save dialog with the corresponding options.

Loading a petrinet

The editor is able to load, display and edit XML files that have been saved with the extensions .xml and .pnml. However, it is only possible to read a XML file that actually contains a valid petrinet, which is confirmed by checking for the <pnml> tag that must be the first tag after the XML declaration. Other than this, a valid petrinet may not contain duplicate ids. When trying to load an invalid file, a corresponding error message will be displayed.

Loading a petrinet from a file can be done by clicking on the menu item "File" in the main menu and then "Open File...", or by just pressing Strg+O. Alternatively it is also possible to left-click on the folder symbol in the toolbar. Since the current petrinet needs to be closed in order to load a new petrinet, there will be a query, if changes should be saved in case there are any unsaved changes. If "Yes" is selected, a save will occur either to the previously selected file or, if there is no previously selected file, a dialog will be displayed, which allows for a file to save the changes to be selected. After this a dialog will be displayed, which allows for the selection of a file to load. It is possible to select any file with an extension of .xml or .pnml, from which the contained petrinet is finally loaded.

Clearing the workspace

Once the edit of the current petrinet is finished and a new petrinet is to be started, this can be accomplished by clicking on the main menu item "File" and then "New", or by just pressing Ctrl+N. Alternatively it is also possible to left-click on the symbol in the toolbar that shows an empty page with a star.

If there are unsaved changes to the current petrinet, there will be a query before finishing the work, if changes should be saved. If "Yes" is selected, a save will occur either to the previously selected file or, if there is no previously selected file, a dialog will be displayed, which allows for a file to save the changes to be selected. After this the current petrinet will be closed and the workspace will be cleared in order to start work an a new petrinet.